

The Quality of Our Nation's Waters

# Pesticides in the Nation's Streams and Ground Water, 1992–2001



National Water-Quality Assessment Program

Circular 1291



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# **Pesticides in the Nation's Streams and Ground Water, 1992–2001**

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“The Heinz Center depends heavily on NAWQA data to support our periodic report: ‘The State of the Nation’s Ecosystems.’ NAWQA data provide the foundation for our description of chemical contamination—including pesticides and other compounds—both nationally and among different land uses, and for tracking how contaminant levels change over time. We appreciate NAWQA’s strong commitment to making its information and data readily accessible to meet our organization’s needs and to address the Nation’s water-resource information needs.”

*Robin O’Malley, Senior Fellow and Program Director,  
The H. John Heinz III Center for Science, Economics and the  
Environment*

“EPA has worked closely with the USGS NAWQA Program since it began in 1991, with the goal of advancing the scientific tools and data that are available to assess the potential risks posed by pesticides in surface water and ground water. Recently, EPA and USGS have collaborated in developing statistical models to predict concentrations of atrazine and other pesticides in streams around the country, including quantitative estimates of reliability. The models, developed by USGS from NAWQA data, increase EPA’s capacity to estimate surface-water concentrations of pesticides. Model results are being used to identify locations where additional monitoring may be needed to evaluate the ecological condition of watersheds.”

*Elizabeth Behl, Chief of Environmental Risk Branch,  
Office of Pesticide Programs,  
U.S. Environmental Protection Agency*

# NAWQA

## National Water-Quality Assessment Program

The U.S. Geological Survey (USGS) is committed to serving the Nation with accurate and timely scientific information that helps enhance and protect the overall quality of life, and facilitates effective management of water, biological, energy, and mineral resources (<http://www.usgs.gov/>). Information on the quality of the Nation's water resources is of critical interest to the USGS because water quality is integrally linked to the long-term availability of water that is clean and safe for drinking and recreation and that is suitable for industry, irrigation, and habitat for fish and wildlife. Escalating population growth and increasing demands for multiple water uses make water availability, now measured in terms of quantity and quality, even more critical to the long-term sustainability of our communities and ecosystems.

The USGS implemented the National Water-Quality Assessment (NAWQA) Program (<http://water.usgs.gov/nawqa/>) to support national, regional, and local information needs and decisions related to water-quality management and policy. Shaped by and coordinated with ongoing efforts of other Federal, State, and local agencies, the NAWQA Program is designed to answer: What is the quality of our Nation's streams and ground water? How is the quality changing over time? How do natural features and human activities affect the quality of streams and ground water, and where are those effects most pronounced? By combining information on water chemistry, physical characteristics, stream habitat, and aquatic life, the NAWQA Program aims to provide science-based insights for current and emerging water issues and priorities. NAWQA results can contribute to informed decisions that result in practical and effective water-resource management and strategies that protect and restore water quality.

Since 1991, the NAWQA Program has implemented interdisciplinary assessments in 51 of the Nation's most important river basins and aquifers, referred to as Study Units, and the High Plains Regional Ground Water Study (see accompanying map and list of studies). Collectively, these areas account for more than 70 percent of total water use (excluding thermoelectric and hydropower) and more than 50 percent of the population's supply of drinking water. The areas are representative of the Nation's major hydrologic landscapes, priority ecological resources, and agricultural, urban, and natural sources of contamination.

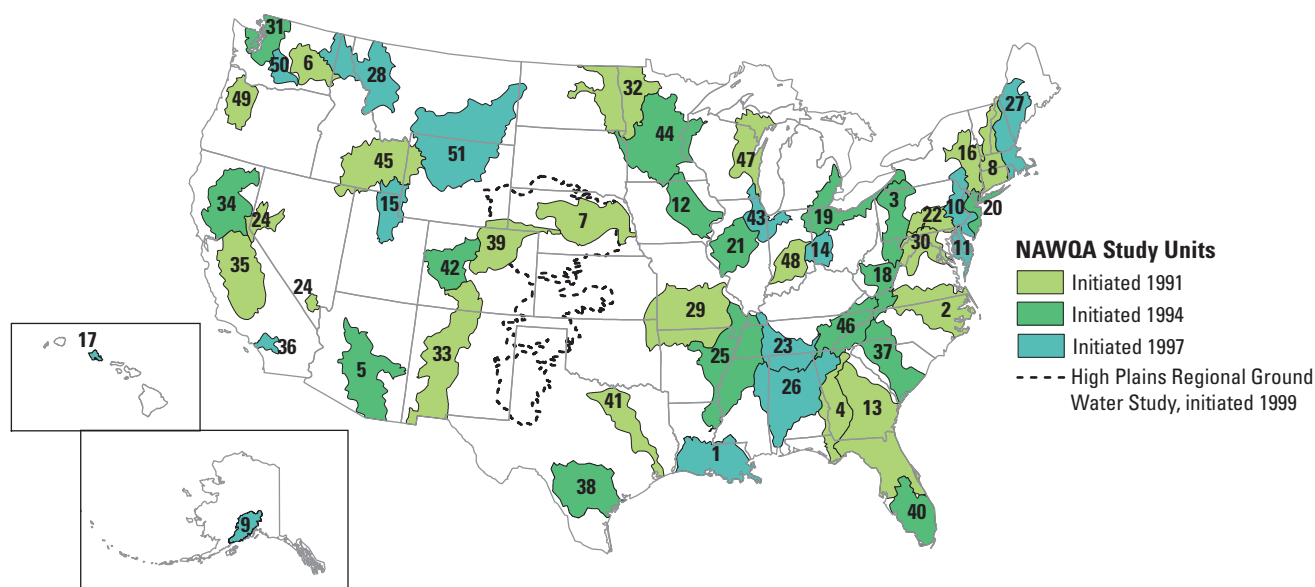
Each assessment is guided by a nationally consistent study design and methods of sampling and analysis. The assessments thereby build local knowledge about water-quality issues and trends in a particular stream or aquifer while providing an understanding of how and why water quality varies regionally and nationally. The consistent, multi-scale approach helps to determine if certain types of water-quality issues are isolated or pervasive, and allows direct comparisons of how human activities and natural processes affect water quality and ecological health in the Nation's diverse geographic and environmental settings. Comprehensive assessments of pesticides, nutrients, volatile organic compounds, trace elements, and aquatic ecology are developed at the national scale through national data analysis and comparative analysis of the Study Unit findings.

The USGS places high value on the communication and dissemination of credible, timely, and relevant science so that the most recent and available knowledge about water resources can be applied in management and policy decisions. We hope this NAWQA publication will provide you the needed insights and information to meet your needs, and thereby foster increased awareness and involvement in the protection and restoration of our Nation's waters.

The NAWQA Program recognizes that a national assessment by a single program cannot address all water-resource issues of interest. External coordination at all levels is critical for a fully integrated understanding of watersheds and for cost-effective management, regulation, and conservation of our Nation's water resources. The Program, therefore, depends extensively on the advice, cooperation, and information from other Federal, State, interstate, Tribal, and local agencies, nongovernmental organizations, industry, academia, and other stakeholder groups. The assistance and suggestions of all are greatly appreciated.

*Robert M. Hirsch  
Associate Director, Water*





### NAWQA Study Units

- |    |   |    |  |
|----|---|----|--|
| 1  | Acadian–Pontchartrain Drainages                               | 27 | New England Coastal Basins               |
| 2  | Albemarle–Pamlico Drainage Basin                              | 28 | Northern Rockies Intermontane Basins     |
| 3  | Allegheny and Monongahela River Basins                        | 29 | Ozark Plateaus                           |
| 4  | Apalachicola–Chattahoochee–Flint River Basin                  | 30 | Potomac River Basin                      |
| 5  | Central Arizona Basins  | 31 | Puget Sound Basin                        |
| 6  | Central Columbia Plateau                                      | 32 | Red River of the North Basin             |
| 7  | Central Nebraska Basins                                       | 33 | Rio Grande Valley                        |
| 8  | Connecticut, Housatonic, and Thames River Basins              | 34 | Sacramento River Basin                   |
| 9  | Cook Inlet Basin  | 35 | San Joaquin–Tulare Basins                |
| 10 | Delaware River Basin  | 36 | Santa Ana Basin                          |
| 11 | Delmarva Peninsula  | 37 | Santee River Basin and Coastal Drainages |
| 12 | Eastern Iowa Basins   | 38 | South-Central Texas                      |
| 13 | Georgia–Florida Coastal Plain                                 | 39 | South Platte River Basin                 |
| 14 | Great and Little Miami River Basins                           | 40 | Southern Florida                         |
| 15 | Great Salt Lake Basins  | 41 | Trinity River Basin                      |
| 16 | Hudson River Basin  | 42 | Upper Colorado River Basin               |
| 17 | Island of Oahu  | 43 | Upper Illinois River Basin               |
| 18 | Kanawha–New River Basins                                      | 44 | Upper Mississippi River Basin            |
| 19 | Lake Erie–Lake Saint Clair Drainages                          | 45 | Upper Snake River Basin                  |
| 20 | Long Island–New Jersey Coastal Drainages                      | 46 | Upper Tennessee River Basin              |
| 21 | Lower Illinois River Basin                                    | 47 | Western Lake Michigan Drainages          |
| 22 | Lower Susquehanna River Basin                                 | 48 | White River Basin                        |
| 23 | Lower Tennessee River Basin                                   | 49 | Willamette Basin                         |
| 24 | Las Vegas Valley Area and the Carson and Truckee River Basins | 50 | Yakima River Basin                       |
| 25 | Mississippi Embayment   | 51 | Yellowstone River Basin                  |
| 26 | Mobile River Basin  |    |  |

# Introduction to this report and the NAWQA series

## The Quality of Our Nation's Waters



This report is one of a series of publications, The Quality of Our Nation's Waters, that describe major findings of the NAWQA Program on water-quality issues of regional and national concern. This report presents evaluations of pesticides in streams and ground water based on findings for the first decadal cycle of NAWQA. "Pesticides in the Nation's Streams and Ground Water, 1992–2001" greatly expands the analysis of pesticides presented in "Nutrients and Pesticides," which was the first report in the series and was based on early results from 1992 to 1995. Other reports in this series cover additional water-quality constituents of concern, such as volatile organic compounds and trace elements, as well as physical and chemical effects on aquatic ecosystems. Each report builds toward a more comprehensive understanding of regional and national water resources.

The information in this series is intended primarily for those interested or involved in resource management, conservation, regulation, and policymaking at regional and national levels. In addition, the information might interest those at a local level who wish to know more about the general quality of streams and ground water in areas near where they live and how that quality compares with other areas across the Nation.

*P. Patrick Leahy, Acting Director  
U.S. Geological Survey*



## Contents

Chapter 1 is a broad overview of key national findings and their implications. Chapters 2 and 3 provide background on pesticides and how they were assessed by NAWQA. Together, Chapters 4 and 5 provide a detailed assessment of findings regarding the occurrence and behavior of pesticides in streams and ground water. Chapter 6 evaluates the occurrence and distribution of pesticides in terms of the potential for effects on human health, aquatic life, and wildlife. Chapters 7 and 8 examine two important topics with implications for the future—prediction of pesticide levels for unmonitored areas and emerging evidence of long-term trends.

<b>1</b>	Overview of Findings and Implications .....	1
<b>2</b>	Pesticide Primer .....	21
<b>3</b>	NAWQA's Approach to Pesticide Assessment .....	31
<b>4</b>	Occurrence and Distribution in Streams and Ground Water .....	41
<b>5</b>	Complexities: Seasonality, Mixtures, and Degradates .....	67
<b>6</b>	Potential for Effects on Human Health, Aquatic Life, and Wildlife .....	87
<b>7</b>	Prediction Where Data are Inadequate .....	119
<b>8</b>	Long-Term Trends .....	127
	References Cited .....	137
	Glossary .....	145
	Appendix 1—Pesticide Compounds Analyzed .....	153
	Appendix 2—Properties Affecting Transport and Fate .....	159
	Appendix 3—Water-Quality Benchmarks .....	161
	Appendix 4—List of Abbreviations .....	171